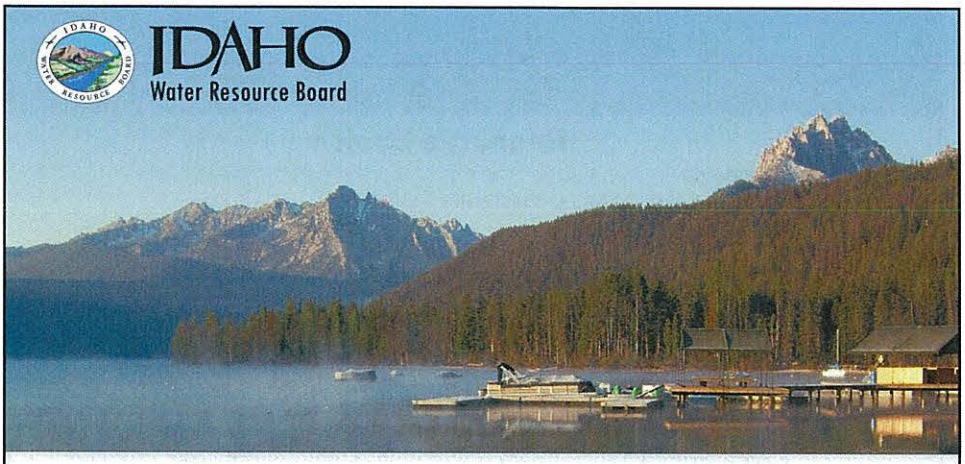

EASTERN SNAKE PLAIN RECHARGE

TREASURE VALLEY CAMP November 10, 2010

BILL QUINN, P.E., IDAHO DEPARTMENT OF WATER RESOURCES

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Eastern Snake Plain Aquifer (ESPA)Recharge

- Recharge Basics
- ESPA Aquifer Characteristics
- Recharge Water Rights
- Water Board Role
- Canal Company/Irrigation District Role
- Water Board/Canal Company Contracts
- Reporting, Verification and Payment

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Recharge Basics

- **Natural Recharge**
  - precipitation infiltrating into ground water aquifers
- **Artificial Recharge**
  - artificial placement of water from a different source into a ground water aquifer
- **Managed Aquifer Recharge**
  - source water can be from a river, lake or separate aquifer
  - in Idaho is primarily used to mitigate ground water withdrawals or ground water quality
  - can be accomplished by surface infiltration or well injection
    - infiltration best suited for untreated water. Large volumes, low cost
    - injection requires high quality source water. Lower volume, more expensive
- **Aquifer Storage and Recovery (ASR)**
  - currently no ASR in Idaho
- **Applications**
  - replenishment of depleted aquifers
  - water quality and water supply mitigation
  - low cost storage of large volumes
  - provides a method to capture water that may not be available in the future

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Eastern Snake Plain
Managed Passive Recharge

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Eastern Snake Plain Aquifer

- fractured basalt, approximately 11,000 square miles (~ 200 mi. long by ~ 60 mi. wide)
- total storage in the upper 500 ft. estimated at 200-300 maf, roughly equivalent to Lake Erie (116 mi^3 , 392 maf)
- well yields above 3,000 gpm are common and transmissivity is high
- hydraulic gradient (flow direction) is southwest
- primary discharge is in the Thousand Springs area, near Hagerman

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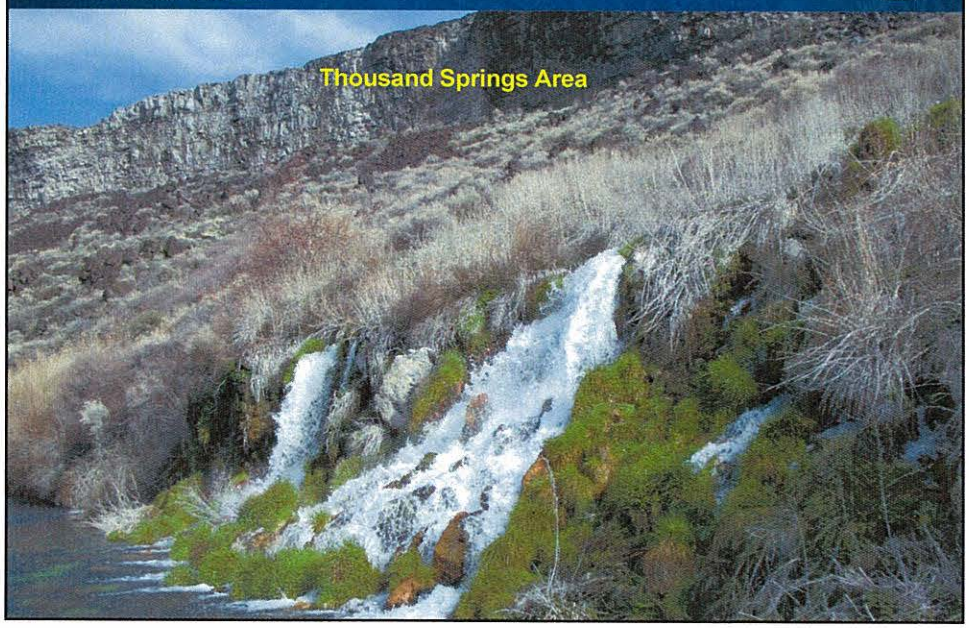

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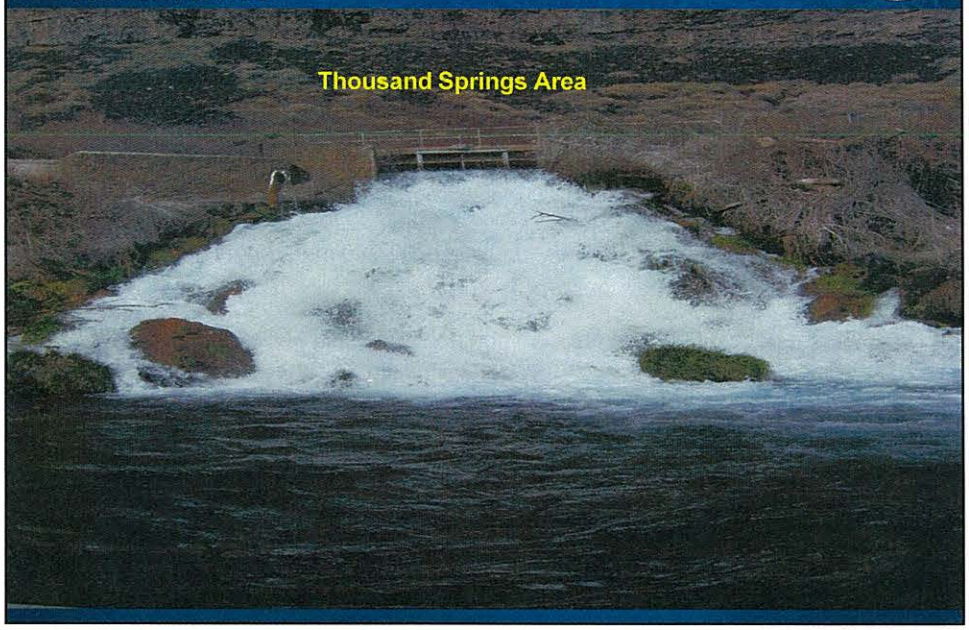

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Eastern Snake Plain Canals and Leakage

- ~ 2 million irrigated acres ~ half surface and half ground water
- canals constructed between 1900 and 1935
- most canals are unlined and leak ~ 30 %
- one canal diverting 1 maf/season loses ~ 300 kaf (~1,700 af/day)
- 1980-2002 average leakage (incidental recharge) ~ 3.4 maf

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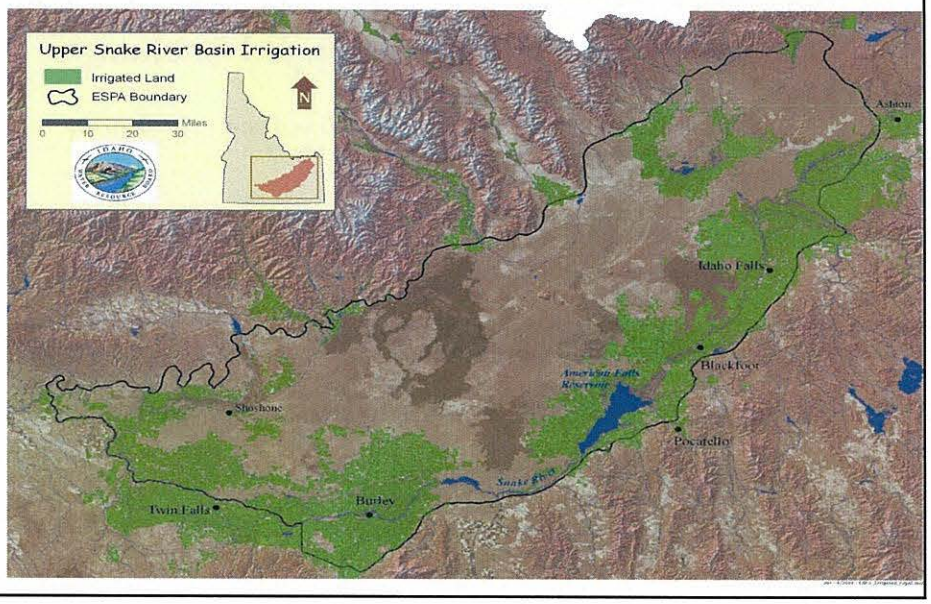

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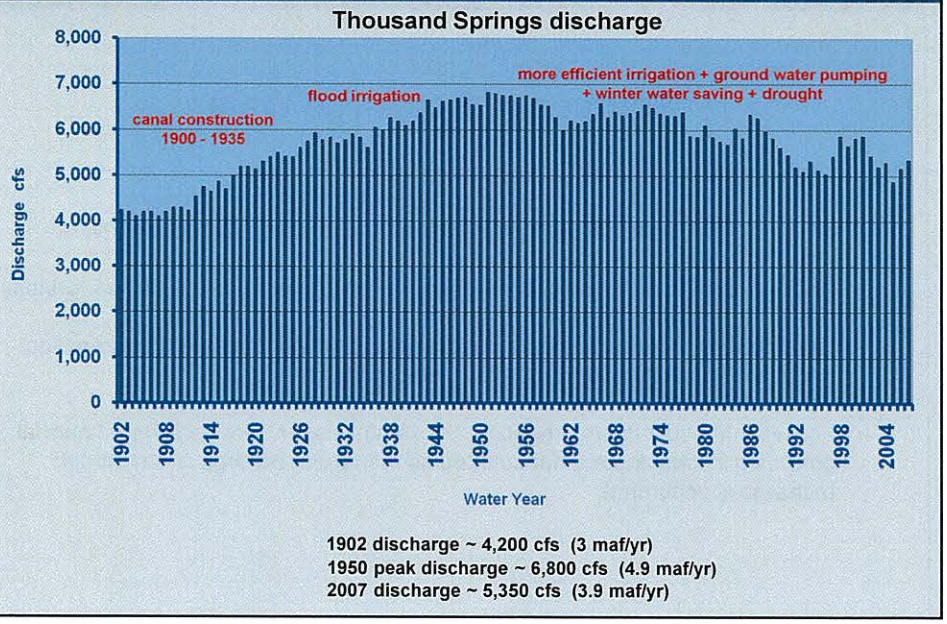

1902 discharge ~ 4,200 cfs (3 maf/yr)
1950 peak discharge ~ 6,800 cfs (4.9 maf/yr)
2007 discharge ~ 5,350 cfs (3.9 maf/yr)

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Eastern Snake Plain Managed Recharge

- large volume, low cost, passive process: 185,944 ac-ft (2009-2010)
  $3.00/a-f
- allows use of recharge rights before (after) senior irrigation rights are used
- extends the time water is in canals
- sponsored by the Idaho Water Resource Board under contract with canal companies/irrigation districts
- Water Board pays cash incentive to encourage canal companies to participate
- recharge is a major component of the ESPA CAMP
  - water budget change of 600 kaf annually by 2030
  - by stabilizing and improving spring flows, ground water levels and river flows

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Sources of Recharge Water

- Idaho Water Resource Board recharge rights
  -1980 priority, 1,200 cfs diversion from the Snake River
  -1980 priority, 800 cfs diversion from the Big/Little Wood Rivers
- Snake & Big/Little Wood Rivers – generally good quality, low TDS, low turbidity
- Water Board's Recharge rights generally in priority before and after irrigation season (before April 15th and after October 15th)
- Losses that occur during irrigation, "incidental losses", are considered normal operating losses and are not counted as managed recharge (even though recharge is occurring)

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Contracting, Reporting, Verification & Payment

- two party annual, renewable contracts between the Water Board and canal companies, essentially available to all
- measurements made by canal personnel, subject to verification by IDWR.
- reports submitted to IDWR
- upon approval of recharge reports, payment made to canal company by Water Board

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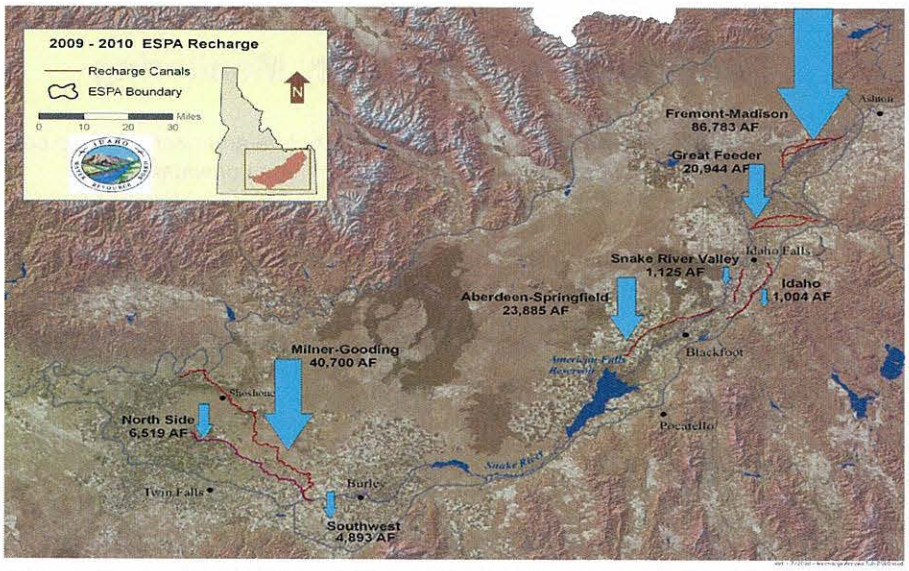

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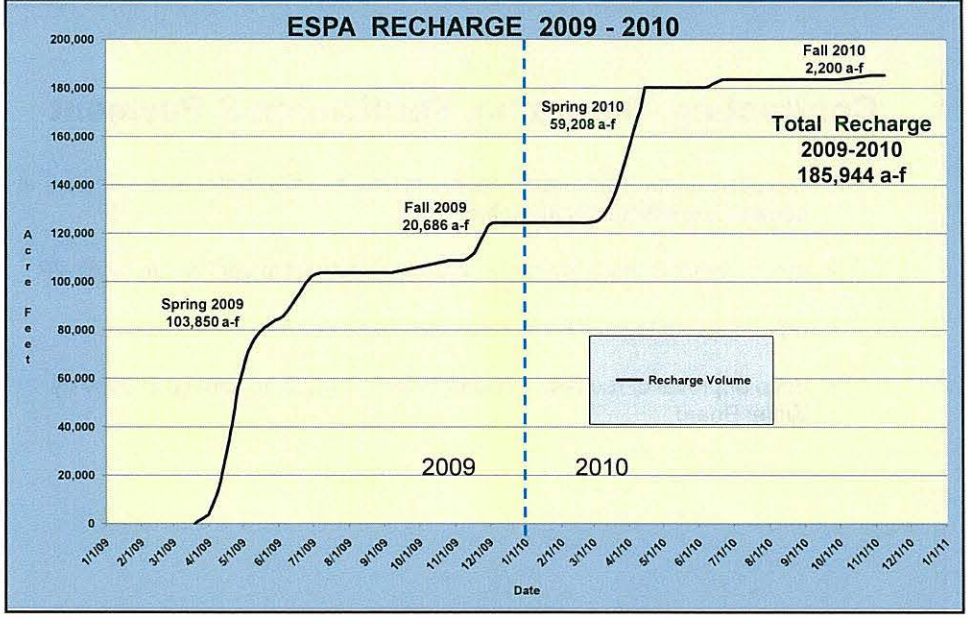

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Permitting & Water Quality Monitoring

- recharge that occurs through canal losses before and after irrigation season is considered a normal canal operation. No permit or water quality monitoring is required by IDEQ
- recharge at designated off-canal recharge sites requires IDEQ approval and water quality monitoring
- recharge by injection requires a UIC permit issued by IDWR

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Measuring the Benefits of Recharge: ESPA Model

- collaboration between IDWR, USGS, USBOR, U of Idaho, Idaho National Lab, USF&W, Idaho Power Co., consultants, and managed by IDWR
- over 1,000 monitoring wells
- over 2,500 computed reach gains/losses in 11 Snake River reaches
- illustrates the benefits of recharge by steady state and transient responses in the 11 river reaches

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So what good are these !##*#!! canals if they leak so much ??

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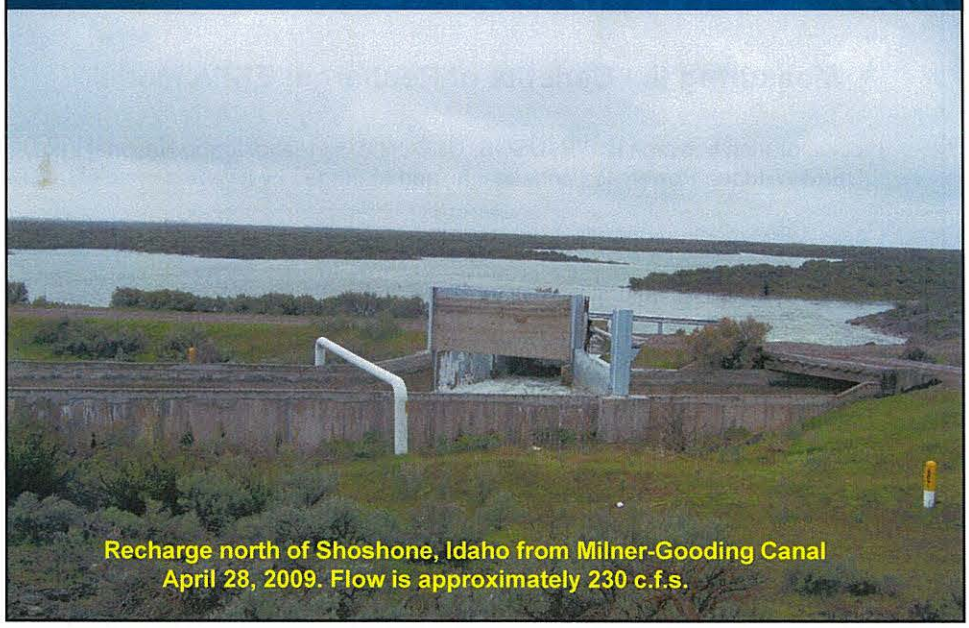

Recharge north of Shoshone, Idaho from Milner-Gooding Canal
April 28, 2009. Flow is approximately 230 c.f.s.

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Final Comment

A successful managed recharge program is highly dependent on local conditions. Among the more important considerations are:

- well defined recharge objectives
- availability and quality of source water
- quality of receiving ground water
- aquifer characteristics
- sufficient depletion to accommodate recharge water
- land availability
- institutional constraints
- regulatory and water rights issues
- economic considerations